E. Sand Bedding Material for Precast Structures

No separate payment will be made for this material. Its cost is included in the Contract Price for the structure under which it is used.

F. Excavation and Normal Backfill

No separate payment will be made for excavation and normal backfill. Their cost is included in the Contract Price for the structure being excavated.

G. Safety Grates

Safety grates will be paid for at the Contract Price per square foot (meter).

H. Inlets for Safety Grates

Inlets for safety grates will be paid for at the Contract Price per cubic yard (meter) of Class "A" concrete, including reinforcing steel.

I. Vertical Tee Sections (or Saddles)

Vertical tee sections will be included in payment for the section of structure they are incorporated in.

No separate payment will be made for excavation, backfill, and disposal of surplus material.

Payment will be made under:

Item No. 668	Catch basin, group_____	Per each
Item No. 668	Catch basin, group_____ additional depth	Per linear foot (meter)
Item No. 668	Drop inlet, group_____	Per each
Item No. 668	Drop inlet, group_____ additional depth	Per linear foot (meter)
Item No. 668	Sanitary sewer manhole, type_____	Per each
Item No. 668	Sanitary sewer manhole, type_____, additional depth class_____	Per linear foot (meter)
Item No. 668	Storm sewer manhole, type_____	Per each
Item No. 668	Storm sewer manhole, type_____, additional depth class_____	Per linear foot (meter)
Item No. 668	Junction box	Per each
Item No. 668	Spring box	Per each
Item No. 668	Drain inlet, __ in (mm)	Per each
Item No. 668	Safety grate, type_____	Per square foot (meter)
Item No. 500	Class A concrete, including bar reinforcing steel	Per cubic yard (meter)

668.5.01 Adjustments

General Provisions 101 through 150.

Section 670—Water Distribution System

670.1 General Description

This work includes furnishing materials for installing, relocating, and adjusting water distribution systems according to the Plans and Specifications.

670.1.01 Definitions

General Provisions 101 through 150.

670.1.02 Related References

A. Standard Specifications

Section 104—Scope of Work

Section 107—Legal Regulations and Responsibility to the Public

Section 207—Excavation and Backfill for Minor Structures

Section 444—Sawed Joints in Existing Pavements

Section 500—Concrete Structures

Section 555—Tunnel Liner

Section 611—Relaying, Reconstructing or Adjusting to Grade of Miscellaneous Roadway Structures

Section 615—Jacking or Boring Pipe

Section 810—Roadway Materials

Section 841—Iron Pipe

Section 847—Miscellaneous Pipe

Section 848—Pipe Appurtenances

B. Related Documents

General Provisions 101 through 150.

670.1.03 Submittals

General Provisions 101 through 150.

670.2 Materials

A. Cast Iron and Ductile Iron Pipe

See Section 841. Use pipes with mechanical or push-on joints. If the Plans or the Engineer allow, use bell and spigot pipe with lead joints.

Ensure that pipes are the class called for on the Plans.

B. Cast Iron Fittings

See Section 841. Fittings consist of cast iron bends, tees, crosses, plugs and reducers, double hub tapped tees, offsets, sleeves, plugs, and other cast iron specials necessary to the work.

Ensure that the class of each fitting is at least the class of pipe to which it is connected.

Use fittings furnished with the following:

- The manufacturer's center-to-center and center-to-socket laying dimensions
- The manufacturer's standardized mechanical joints or bell and spigot with lead and rubber joints

C. Gate Valves

See Section 848.2.03. Use gate valves that function as follows:

1. Open to the left, unless otherwise specified
2. Are operated by nut
3. Use operating nuts similar to those used by the local water works system, with an arrow indicating the valve opening direction
4. Are designed for vertical installation with nonrising stems and operating nuts, except as follows:
    - Valves 16 in (400 mm) and larger are designed for horizontal installation with bevel gears, an extended gear case with protectors, track, trunnions, scrapers, and a by-pass.
5. Include mechanical joints, bolts, glands, and gaskets unless otherwise indicated on the drawings or necessary to join existing work
6. Include split sleeve mechanical joint-type tapping sleeves

7. Include mechanical joint hub connections
8. Include valve boxes designed as follows:
    - Made for heavy roadway use
    - Made with cast-iron and two-piece slip or screw
    - Made with round drop covers adjustable up or down to 6 in (150 mm)
    - Made with the proper depth, including extensions, unless otherwise specified

D. Butterfly Valves

Use butterfly valves in water mains 12 in (300 mm) and larger. Ensure that butterfly valves meet these requirements:

- Consist of either a cast iron valve body for buried service or a stainless steel-to-rubber seated tight closing body suitable for two-way flow, Class 150 B
- Contain manual operators sized for line pressure and velocities
- Contain 2 in (50 mm) square operating nuts and extension stems and guides, as required
- Open counterclockwise (to the left)
- Contain mechanical joints suitable for pipeline connections
- Comply with AWWA C-504

E. Service Line Pipes, Fittings, and Appurtenances

Use fittings and appurtenances for pipe, as follows:

1. Fittings

   Use the following fittings for copper, galvanized steel, and plastic pipe:

   a. Copper Pipe (or Tubing)
      - Use cast or wrought pattern copper fittings.
      - Use solder joint fittings for rigid copper pipe.
      - Use flared mechanical fittings, if desired, for concealed soft drawn pipe.
      - Use ground joint unions.
      - See Subsection 847.2.03.

   b. Galvanized Steel Pipe

      See Subsection 847.2.01.

   c. Plastic Pipe

      See Subsection 847.2.05.

2. Appurtenances

   Corporation stops, curb stops, or other appurtenances may be substituted for an adapter if its connections are designed for the appurtenances. Meet the following requirements:

   a. Ensure that corporation stops, curb stops, and other appurtenances for copper, galvanized iron, or plastic pipe service lines meet the requirements of ASTM B 62 and AWWA C 800 for threads.
   b. Use adapters to joint plastic, copper, or galvanized iron pipe to existing facilities.
   c. Use a cut-off key that conforms closely to the type used by the water system that the work is connecting to.

F. Polyvinyl Chloride (PVC) Pipe

See Subsection 847.2.05.A.1.

Use pipes that are furnished with either solvent cement or elastomeric gasket coupling.

G. Steel Pipe Casing

For welding use plain-end casings the size, thickness, length, and coating specified on the Plans.

H. Double Strap Saddles

Ensure that double strap saddles conform to Plan details, or are as directed by the Engineer.

I. Fire Hydrants

Use fire hydrants that meet the latest AWWA Specifications and local code requirements. In addition, fire hydrants shall meet the following parameters:

1. Compressive, Self-Oiling, and Nonfreezing

   Use hydrants sealed and lubricated as follows:

   a. The operating nut is totally sealed away from the hydrant barrel.
   b. A large oil reservoir and packing gland continuously and automatically lubricates working parts.
   c. The drain mechanism operates simply, positively, and automatically.

2. Hydrant Safety Flange and Coupling

   Construct the safety flange and coupling above the ground line to permit rapid replacement.

   Ensure that the force of impact in a traffic accident will break the flange and spread the valve stem coupling.

3. Nozzle Direction

   Construct the hydrant's nozzles to face in any direction at any time by removing the safety flange bolts and revolving the head without digging or cutting off water.

4. Accessibility to Internal Parts

   Ensure that all working parts of the hydrant, including the seat ring, can be removed through the top without digging. Confirm that seat rings are:

   - Made of bronze
   - Shaped and arranged to be readily removable
   - Able to be screwed into a bronze bushing in the shoe

5. Cover Depth

   If needed, supplement the Department-provided 3-1/2 ft (1 m) vertical leader pipe with extension sections at no additional cost.

6. Valve Opening

   Ensure that valve openings are at least 4-1/4 in (106 mm).

7. Hose and Steamer Connection

   Breech-lock the hose and steamer connections into the hydrant barrel, then caulk with lead to seal them permanently, or thread and pin them into the hydrant body.

   Hydrants include two 2-1/2 in (63 mm) hose nozzles and one steamer connection.

8. Threads

   Use "National Standard" threads for hose nozzles and steamer connections, unless otherwise specified.

9. Operating Nut

   Unless otherwise specified, use 5-sided operating nuts with 1 in (25 mm) flat surfaces.

10. Inlet Connection

    Use 6 in (300 mm) inlet connections furnished with mechanical joints to connect to the mechanical joint lead spigot.

J. Concrete Blocking

Use "Class A" concrete for fire hydrant blocking constructed according to Section 500.

670.2.01 Delivery, Storage, and Handling

Carefully handle pipe, fittings, and other materials to avoid breaking or damaging the cement mortar linings.

Do not roll or drop pipe off trucks or cars. To unload pipe, carefully lift and lower it into position using approved slings and clamps.

670.3 Construction Requirements

670.3.01 Personnel

General Provisions 101 through 150.

670.3.02 Equipment

A. Valve-Tapping Machine

Furnish the valve-tapping machine and all other equipment required for each installation.

B. Test Pump and Pressure Measurement

Use a high-quality, reliable test pump and a means of accurately measuring the water required to maintain pressure during the prescribed testing time.

C. Underground Pipe and Cable Finder

Use a high-quality electronic pipe and cable finder to accurately locate underground utilities and other installations to the Engineer's satisfaction.

670.3.03 Preparation

General Provisions 101 through 150.

670.3.04 Fabrication

General Provisions 101 through 150.

670.3.05 Construction

A. Finding Existing Underground Utilities and Obstructions

Comply with Subsection 107.13 and Subsection 107.21.

According to the best information available to the Department, all known water lines, gas lines, telephone conduits, drainage structures, etc., are shown on the Plans. However, to find such installations, use an electronic pipe and cable finder and assist the Engineer in locating existing installations or obstructions to the work.

When unforeseen conflicts require Plan changes, perform the work as altered according to Subsection 104.03 and Subsection 104.04.

B. Excavating Trenches

Excavate trenches to the proper grade, depth, and width as follows:

1. Trench to Grade

   Ensure that excavated trench bottoms are firm, free from boulders, and conform to the established grade.

   a. Backfill, according to Subsection 670.3.05.E.6, any part of the trench excavated below the established grade. Use Class I or Class II Soils (Section 810), and firmly compact the soil.

   b. Where the established grade of a trench is in rock, undercut the bottom of the trench by at least 6 in (150 mm), then backfill and compact according to Subsection 670.3.05.E.6.

      Conduct blasting operations strictly according to Subsection 107.12.

   c. Excavate trenches under pavement to grade as follows:

      1) To remove the pavement, cut it at least 24 in (600 mm) wider than each trench edge to provide solid bearing for the pavement edges when replaced.

         Remove the pavement according to Section 444, except no separate payment will be made for sawed joints unless a bid Item is contained in the Proposal.

      2) Tunnel under existing sidewalks, curbs, gutters, and pavements according to Section 555.

      3) Where possible, jack pipe under an existing pavement according to Section 615, except no separate payment will be made for jacking and boring pipe unless a bid Item is included in the Proposal.

2. Minimum Trench Depth

   Excavate trenches to provide at least 48 in (1.2 m) cover depth from the pipe to the finished pavement surface, sidewalk, grass plot, etc. unless indicated otherwise on the Plans or by the Engineer.

   If any part of a water main is to be placed in or under a new embankment, finish the embankment to at least a 2 ft (600 mm) plane above the pipe barrel before excavating the trench.

3. Trench Width

   Excavate trenches wide enough to allow proper installation of pipe, fittings, and other materials.

4. Trench Bellholes

   Excavate bell holes deeply and widely enough to make joints and to allow the pipe barrel to rest firmly on the ditch bottom.

C. Connecting to Existing Mains

Connect to an existing main with the appropriate fittings according to the Plans or the Engineer. When making connections under pressure, i.e., when normal water service must be maintained, furnish and use a tapping sleeve and valve. Connect to existing mains as follows:

1. Before opening new pipe line trenches, locate the various points of connections to be made into existing pipe lines. If necessary, uncover pipe lines for the Engineer to prescribe the connections and fittings needed.
2. Connect to existing pipe lines only to meet operating requirements. Cut existing lines only after obtaining the Engineer's permission.

D. Laying Water Mains and Appurtenances

Lay mains, fittings, and appurtenances as follows:

1. Preparing and Handling Pipes

   Thoroughly clean the pipe and fittings before laying them. Keep them clean until accepted.

   Use suitable tools and equipment. Do not damage the pipe, especially the cement lining inside the cast iron pipe.

   Carefully examine pipe for cracks and other defects and do not lay defective pipe. If pipe or castings appear to be cracked, broken, or defective after laying, remove and replace those sections.

2. Alignment and Gradient

   Ensure that pipe line alignment and gradient are either straight or deflected to closely follow true curves. Deflect pipe lines only where required, within allowable horizontal and vertical deflection angles according to the Plans.

3. Special Requirements for Laying Water Mains

   Excavate, clean, lay, joint, and backfill progressively and uniformly according to these requirements:

   - Never leave pipe in the trench overnight without completely jointing and capping.
   - Do not leave completed pipe line exposed in the trench. Backfill and compact the trench as soon as possible after laying, jointing, and testing are complete.
   - At the close of work each day, and when laying pipe, close the exposed end of the pipe-line in the trench with an approved wood or metal head or barrier.
   - If necessary to cover the end of an incomplete pipe line with backfill, close the end of the pipe with a satisfactory cap or plug.

E. Installing Water Mains

Install water mains as follows:

1. Flexible Joints

   Use the following flexible joints for connections inside the roadway shoulders or curbs and gutters:

   a. Mechanical Joints

      When using mechanical joints:

      1) Thoroughly wash bell sockets, spigots, gland, gasket, nuts, and bolts with soapy water before assembly. Keep these parts wet until the jointing operation is complete.
      2) Tighten nuts within the torque range recommended by the manufacturer. Check the tightening tolerance with a torque wrench.
      3) If effective sealing is not attained at the maximum recommended torque, disassemble, thoroughly clean, then reassemble the joint.
      4) Do not overstress bolts to compensate for improper installation or defective parts.

   b. "Push-On" Type Joints

      Use "push-on" joints made according to the manufacturer's recommendations.

c. Bell and Spigot Connections with Lead Joints

Thoroughly clean the bell inside and the pipe outside. Join bell and spigot connections with lead and gasket as follows:

1) Gasket: Use a tubular or molded rubber gasket installed according to the manufacturer's recommendations.

Use asbestos rope or treated paper rope only with the Engineer's approval when the space between the bell and spigot will not permit the use of a rubber ring.

2) Lead: Place the lead joint at least 2 in (50 mm) deep and pour it to the full depth of the lead groove.

- Keep the melting pot near the joint being poured. Make only one pouring for each joint.
- Do not allow dross to accumulate in the melting pot.
- Thoroughly caulk the joints to secure a tight joint without overstraining the iron in the bells.

2. Cutting Pipe for Water Mains

Use pipe cutters when cutting pipe or special castings. Do not use a hammer and chisel or a cutting torch.

3. Gate Valves on Water Mains

Install and joint gate valves as specified in Subsection 670.2.C. Include the valve box, where required.

4. Fire Hydrants

Install and joint hydrants as specified in Subsection 670.2.I. Include required vertical extension sections. Also, include pipe strap installation, concrete blocking, crushed stone drain, and backfill according to the Plans and this Section.

5. Concrete Blocking

Furnish materials and install concrete blocking according to Subsection 670.2.J. Form and pour concrete blocking at the backs of fittings, including elbows, tees, pipe plugs, fire hydrants, and other locations according to the Plans or the Engineer.

6. Backfilling

Furnish equipment, labor, and when necessary material required for backfilling the pipe line trenches according to Section 207.

a. When testing for leaks in open trenches, do not backfill until testing is complete and leaks are eliminated.

b. When retaining pavement adjacent to trenches, replace removed pavement with the same or better material when approved.

c. After backfilling, maintain a smooth riding surface until the repaving is complete. No separate payment will be made for replaced pavement unless a bid Item for this work is contained in the Proposal.

7. Sterilizing Water Mains

Before placing new and existing pipe lines and appurtenances in service, sterilize them within the overall construction limits. Sterilize in conjunction with the pressure test, if desired.

a. Chlorination

Sterilize using only potable water with calcium hypochlorite (HTH), one percent chlorine solution, or other products acceptable to the Engineer and Department of Public Health.

1) Add enough sterilizing agent to provide a chlorine residual of 10 ppm (parts per million) in 24 hours.

2) At the end of 24 hours, check the chlorine residual. If it is less than 10 ppm, add additional chlorine and check the line again after 24 hours.

b. Flushing

After sterilization, flush the line with potable water until the chlorine residual in tests made at the point of discharge is equal to the chlorine residual of the potable water used for flushing.

c. Sampling

Take all samples in the presence of the Engineer.

1) Leave the pipe line full for 24 hours and request the local Health Department to take bacteriological samples to the Georgia Department of Public Health for analysis.

2) When test results are not satisfactory, sterilize again, without additional compensation, until satisfactory samples are obtained.

F. Laying Service Lines and Appurtenances

Except as modified in this Section, construct and install service lines according to the requirements for laying water mains.

Install service lines at locations shown on the Plans or where designated by the Engineer. Install new pipe from the water main to the final location of the meter or to points designated by the Engineer to connect with existing or future service lines on abutting property.

A complete service line pipe installation includes all connections using unions, valves, fittings, corporation stops, goosenecks where permitted, and curb stops.

1. Excavation for Service Lines

   Excavate as previously specified in Subsection 670.3.05.B, with the following exceptions:

   - Ensure that trenches under pavements and across driveways are deep enough to provide at least 48 in (1.2 m) of cover, unless otherwise directed by the Engineer.
   - At other areas, trench depth and backfill cover may be adjusted at the discretion of the Engineer to provide at least 18 in (450 mm) of cover.

2. Backfill for Service Lines

   Backfill as specified in Subsection 670.3.05.E.6 for water mains, with the following exception:

   - Backfill only after a leakage test has been made under normal operating pressure in open trenches and all leaks have been eliminated.

3. Laying and Jointing Service Lines

   Install copper, galvanized steel, and plastic service lines as follows:

   a. Copper Pipe

      1) Cut square and burr internal and external pipe ends before inserting them in fitting sockets.
      2) Sand pipe ends clean and wire-brush fitting sockets clean to ensure 100 percent tinning of the socket and pipe joint surfaces and full solder penetration of the joint. Do not use acid or acid-based material for surface cleaning.
      3) While the solder is still molten, wipe the solder bead at the external joint with a dry cloth.

   b. Galvanized Steel Pipe

      Install galvanized steel pipe according to the applicable trenching and laying specifications for other service lines, as they apply. (See Subsection 670.2.E.1.b.)

   c. Plastic Pipe

      Install plastic service line pipe according to the manufacturer's recommendations.

      Use compression or flare connections.

      1) Snake plastic pipe in the trench, allowing at least one percent additional pipe length for thermal contraction.
      2) Before backfilling, run water through the pipe to cool to operating temperature. Under normal line operating pressure, check all joints for leaks.
      3) After repairing leaks, backfill the trench with 6 in (150 mm) of clod- and rock-free material. Thoroughly tamp before proceeding with normal backfill.

G. Relocating, Adjusting, and Removing

1. Fire Hydrants and Water Valves

   Relocate, adjust to grade, or remove fire hydrants and water valves and valve boxes according to the Plans or as designated by the Engineer.

   a. Protect parts during removal and relocation. Replace lost or damaged Items at no expense to the Department.
   b. Melt out lead or composition joints. Disconnect each joint before removing them from the trench.
   c. Install relocated gate valves or fire hydrants as specified for new gate valves or fire hydrants.
   d. Construct concrete blocking as specified above for fire hydrants (see Subsection 670.2.I).
   e. Remake tests for leakage and retest until no leaks appear.
   f. Backfill as specified in Subsection 670.3.05.E.6.
   g. Consider valve boxes part of the valve assembly and remove them intact with the valve.

Concrete blocking and additional pipe required to reset the gate valve or fire hydrant at its new location will be paid for separately.

2. Existing Water Meters and Boxes

   Relocate these according to the Plans or the Engineer.

   a. To relocate water meters, remove the existing meter and box and install a short section of pipe in their place.
   b. Inspect, along with the Engineer, each meter before its removal to determine the meter's condition. The Department will replace defective meters.

   This Item also includes, without additional compensation, required pipe, unions and appurtenances, necessary storage protection, and reinstallation of the meter, meter box, and curb stop in the existing service line, as directed.

3. Existing Water Service Lines

   Water lines will be adjusted to grade by excavating the existing lines, lowering or raising the lines, and backfilling according to the Plans or the Engineer.

   a. Furnish new materials or fittings required for the adjustment without additional compensation.
   b. Change connections at the main that result from this work.
   c. Repair leaks and damage caused by the operations at no expense to the Department.
   d. When retaining a water meter where an existing service line is to be adjusted, adjust the existing meter and box to the proper grade without additional compensation.

4. Existing Water Meter and Water Valve Boxes

   Lower or raise these to the grade established on the Plans or by the Engineer according to Section 611.

670.3.06 Quality Acceptance

A. Testing Water Mains

When the Engineer approves a section of pipe for testing, furnish the materials, equipment, and labor to conduct the test. Use a test pump and a means of measuring the water necessary to maintain the required pressure during the prescribed testing time.

Furnish, install, and remove temporary bulkheads, flanges, plugs, and corporation stops at high points in the pipe line and at the test pump, when necessary.

Use the following testing sequence:

1. Preparation

   Whenever the Engineer determines, test pipe lines before backfilling the trench and service installing lines. However, if high-pressure testing after service lines are in place, shut the lines off at the corporation stops.

   After installing necessary joints, bulkheads, etc., place corporation stops, if no other means can be provided, in the high points of the pipe line and at the pump. Blow the pipe free of air according to accepted procedure.

2. Testing Requirements

   Follow these requirements when testing:

   - Ensure that the test pressure is 50 lbs/in² (345 kPa) higher than the designated class pressure of pipe and fittings.
   - Ensure that leakage does not exceed 15 gal/in of pipe diameter/ mile (1.4 L of pipe diameter/km) per 24 hours.
   - Test the pipe line for two hours.
   - If the Engineer determines that additional testing is required, perform the procedure with no additional compensation.
   - When service lines cannot be isolated (i.e., shut off from the section to be tested), or where pressure testing as described above may cause damage, test the line under normal operating pressure as approved by the Engineer.

   Where possible, do this work in open trenches. Replace cracked, broken, or defective materials and carefully remake joints that leak.

B. Retesting

After the Engineer feels the above conditions have been corrected, retest the lines until they pass the necessary requirements. No additional compensation will be made for the corrections or retesting.

670.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

670.4 Measurement

Water mains, service lines, and other items of work in this Specification, complete, in place, and accepted, are measured for payment as follows:

A. Water Mains

Water mains are measured in linear feet (meter) for each size installed. The mains are measured along the center, parallel to the slope of the pipe, from end of each installation through all valves and fittings.

B. Fittings

Pipe fittings are considered subsidiary to the water line in which they are used and are not measured for separate payment.

C. Gate Valves Including Boxes

When required, these are measured by the number of each size installed.

D. Tapping Sleeve and Valve Assembly

These are measured by the number of each size installed.

E. Fire Hydrants

These are measured by the number of each installed.

F. Service Lines

Service lines are measured in linear feet (meter) for each size of service pipe installed. Measurements are made from end to end and from center of lines to ends of branches including valves and fittings. Valves and fittings are not measured separately for payment.

G. Existing Fire Hydrants, Water Valves, and Water Meters Relocated

Existing fire hydrants, water valves, and water meters are measured by the number of each actually relocated, including relocation and final adjustment of boxes.

H. Existing Meter Boxes and Valve Boxes Adjusted to Grade

Existing meter boxes and valve boxes, adjusted to grade in their original locations, are measured by the number adjusted according to Section 611.

I. Water Valves and Fire Hydrants Removed

Existing water valves, including boxes when necessary, and fire hydrants are measured by the number of each removed.

J. Excavation for Trenches

Excavation is not measured for payment separately, but its cost is included in the amount bid for the Item to which it pertains.

K. Concrete Blocking

The quantity of concrete blocking installed according to and within the limits of Plan details, or as specified, is measured in cubic feet (meters).

L. Service Lines Adjusted to Grade

This Item is measured in linear feet (meters)of service line pipe lowered or raised, including valves, fittings, meters, boxes, and other integral appurtenances. Measurements are made from end to end of actual adjustments.

M. Incidentals

Backfilling, pavement removed, and pavement replaced, including sawing, testing, and sterilizing, are not measured for separate payment.

N. Steel Casing

This is measured in linear feet (meters)for each size installed. Measurements are made along the center, parallel to the slope of the casing.

O. Butterfly Valves Including Boxes

When required, these are measured by the number of each installed.

P. Double Strap Saddles

These are measured by the number of each size installed.

670.4.01 Limits

General Provisions 101 through 150.

670.5 Payment

The Contract Unit Price for each Item, complete and accepted, will include all costs incidental to the construction of the Item according to the Plans and as specified in this Section.

The Unit Prices bid will include due allowance for the salvage value of all materials removed from existing or temporary lines, and not installed in the completed work. All such surplus items will become the property of the Contractor unless otherwise specified.

Payment for any Item listed below is full compensation for the Item or Items, complete in place. When placing water mains or service lines in casings, receive separate payment for the cost of furnishing and installing the casings.

A. Water Main Pipe

These will be paid for at the Contract Unit Price per linear foot (meter) for each size of pipe installed. Payment is full compensation for furnishing all materials including fittings, excavating, backfilling, removing, and replacing pavement, testing and sterilizing, and providing other incidentals necessary to complete the Item. Payment will also include the cost of laying pipe in casing when required.

B. Gate Valves

These will be paid for at the Contract Unit Price per each for each size of valve installed, complete in place, including the box, if required. Payment will include material and labor for joint connections.

C. Tapping Sleeve and Valve Assemblies

These will be paid for at the Contract Unit Price per each size installed, complete in place, including materials and labor for joint connections.

D. Fire Hydrants

These will be paid for at the Contract Unit Price per each hydrant installed, complete in place, including vertical extensions, joint connections, pipe straps, crushed stone drain, and other incidentals necessary to complete the Item.

E. Service Line Pipe

This will be paid for at the Contract Unit Price per linear foot (meter) for each size of pipe or tubing. Payment is full compensation for excavating, backfilling, removing, and replacing pavement, testing and sterilizing, placing corporation and curb stops and goosenecks, where required, placing fittings, jointing, and connecting to the main, and providing other incidentals necessary to complete the Item. Payment will also include laying pipe in casing when required.

F. Relocation of Existing Fire Hydrant

This will be paid for at the Contract Unit Price per each, complete in place, including crushed stone drain and other incidentals necessary to complete the Item.

G. Relocation of Existing Water Valve, Including Box

This will be paid for at the Contract Unit Price per each set, complete in place, including excavation, backfill, and other incidentals necessary to complete the Item.

H. Relocation of Existing Water Meter, Including Box

This will be paid for at the Contract Unit Price per each set, complete in place, including excavation, backfill, and other incidentals necessary to complete the Item.

I. Adjusting Existing Meter Boxes and Valve Boxes

These will be paid for according to Section 611.

J. Removal of Existing Water Valves to Grade

This will be paid for at the Contract Unit Price per each water valve removed. Valve boxes, when existing, will be included and removed without additional compensation.

K. Removal of Existing Fire Hydrants

This will be paid for at the Contract Unit Price per each fire hydrant removed.

L. Excavation for Trenches

No separate payment will be made for excavation.

M. Concrete Blocking

This will be paid for at the Contract Unit Price per cubic yard (meter), complete in place. Payment will include excavating, backfilling, forming, and performing necessary Work incidental to placing concrete blocking according to the Plans, or as specified. Payment will be made under Section 500.

N. Steel Casing

This will be paid for at the Contract Unit Price per linear foot (meter) for each size of casing installed. Payment is full compensation for furnishing all materials, excavating, backfilling, removing, and replacing pavement, and providing other incidentals necessary to complete the Item.

O. Butterfly Valves

These will be paid for at the Contract Unit Price per each size of valve installed, complete in place, including the box, if required. Installation includes materials and labor for joint connections.

P. Double Strap Saddles

These will be paid for at the Contract Unit Price per each size installed complete in place, including materials and labor for joint connections.

Payment will be made under:

Item No. 670	Water main_____ in (mm)	Per linear foot (meter)
Item No. 670	Gate valve_____ in (mm)	Per each
Item No. 670	Tapping sleeve and valve assembly __ in (mm) x____ in (mm)	Per each
Item No. 670	Fire hydrant	Per each
Item No. 670	Water service line_____ in (mm)	Per linear foot (meter)
Item No. 670	Relocate existing fire hydrant	Per each
Item No. 670	Relocate existing water valve including box	Per each
Item No. 670	Relocate existing water meter including box	Per each
Item No. 670	Adjust water service line to grade	Per linear foot (meter)
Item No. 670	Remove existing water valve including box	Per each
Item No. 670	Remove existing fire hydrant	Per each
Item No. 670	Steel casing_____ in (mm)	Per linear foot (meter)
Item No. 670	Butterfly valve_____ in (mm)	Per each
Item No. 670	Double strap saddle_____ in (mm) x_____ in (mm)	Per each

670.5.01 Adjustments

General Provisions 101 through 150.

Section 676—Appurtenances for Water Systems

676.1 General Description

This work includes furnishing and installing drinking fountains, wash hydrants, and yard hydrants.

676.1.01 Definitions

General Provisions 101 through 150.

676.1.02 Related References

A. Standard Specifications

Section 500—Concrete Structures

Section 670—Water Distribution System

Section 800—Coarse Aggregate

Section 843—Concrete Pipe

B. Related Documents

General Provisions 101 through 150.

676.1.03 Submittals

General Provisions 101 through 150.

676.2 Materials

A. Drinking Fountains

Use the following materials to construct drinking fountains:

1. Fountain Construction

   Use these materials to construct the fountain:

   - A freeze-proof fountain and valve assembly with jug filler mounted in the base
   - A chrome-plated cast bronze receptor or a 20 gauge (1mm) stainless steel receptor with a 1-1/4 in (31 mm) galvanized iron waste pipe connected to a 2 in (50 mm) galvanized iron drain pipe
   - A chrome-plated vandal-proof bubbler locked to the receptor
   - One freeze-proof valve and one flow regulator supplying the bubbler
   - One freeze-proof valve and one flow regulator supplying the jug filler

2. Valve Construction

   Use these materials to construct the valves:

   - Use valves with a minimum 18 in (450 mm) bury, each with a 3/8 in (9 mm) copper pipe drain connected to a 2 in (50 mm) galvanized drain pipe
   - Actuation by separate handles mounted at heights convenient to adults and children using a service stop
   - A 6 in by 9 1/4 in (130 mm by 235 mm) stainless steel cover plate at each handle
   - A common ¾ in (19 mm) connection to a 1 in (25 mm) water supply line

3. Base of Fountain

   Use these base materials for each drinking fountain:

   - Class A Concrete, Section 500
   - Rubble stone or brick according to the Plan
   - Mortar and grout according to Subsection 834.2.03